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NEWSLETTER OF THE AREA PLANNING BOARD OF PALM BEACH COUNTY 2300 PALM BEACH LAKES BLVD, WEST PALM BEACH, FL. 33409

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PROTECTING SOLAR ACCESS

The present and future use of solar energy technology, one of the principal South Florida alternatives to traditional non-renewable energy resources, requires that individual solar users have access to sufficient sunlight. At present, the use of solar power in South Florida is limited to residential hot water heating, heating pools and minor commercial applications. However, future use may include heating and air conditioning, and perhaps even direct generation of electricity through the use of photovoltaic cells or similar technologies. For solar energy to make a significant contribution to the resolution of domestic energy problems, its use must be sufficiently widespread and reasonably guaranteed. The guarantee that sunlight will be available and warrant the expense of installing a solar device is the principal issue of solar access.

The essential element of solar access protection is controlling shadows which reduce the efficiency of existing solar energy systems and limit the future use of solar systems. To control shadows, design, regulatory, or other mechanisms can be employed; however, such measures must reflect accurately the needs of commonly used solar systems and local climatic, topographic and vegetative characteristics.

To allow efficient, economical functioning of solar systems, sufficient solar energy in the form of sunlight must be received. The term "solar skyspace" identifies the particular portion of the sky above a solar device that must be unobstructed. Two measurements are used to define solar skyspace: altitude and azimuth. Altitude measures the height of the sun above the horizon; generally, it is agreed that the sun must be at least twelve (12) degrees above the horizon to provide usable energy. Azimuth refers to the position of the sun east and west of true, rather than magnetic, north and south. To provide proper access to sufficient amounts of sunlight, the commonly accepted rule of thumb allows for an unobstructed expanse facing the south of forty-five (45) degrees from the southeast and southwest corners of a structure. (See FIGURE 1).

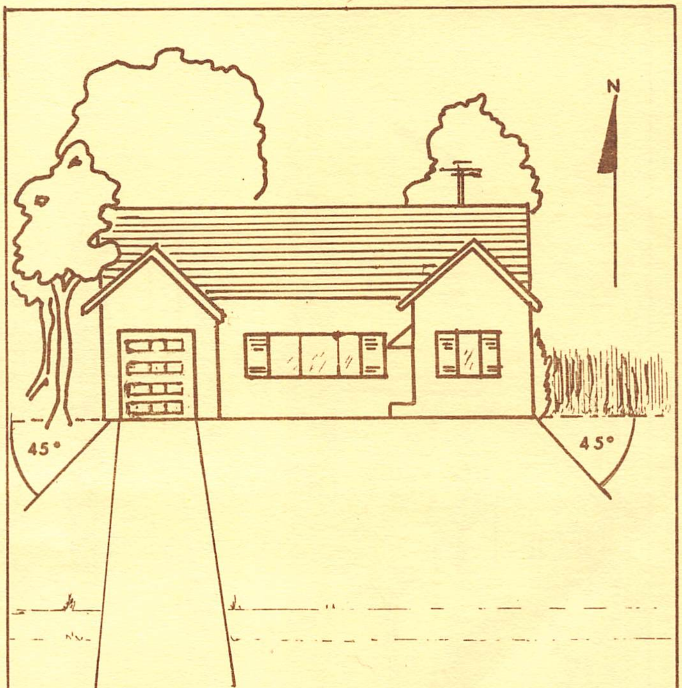

FIGURE I : East and West Solar Azimuths.

SOURCE: USDHUD/USDOE, 1979.

The southerly orientation of solar sky-space is necessary due to the curvature of the earth and orbital changes in the tilt of the earth's axis in relation to the position of the sun. During the shorter winter days, the sun rises further south and at a lower altitude. As a result, days are shorter and the sun's rays strike at a more oblique, less direct angle, reducing the amount of solar energy that can be collected. For many applications of solar energy, it is of critical importance to receive the maximum amount of sunlight available during the shorter daylight hours of winter.

The need to preserve solar access is derived in large measure due to legal aspects of property rights. In this country, ownership of subsurface and above surface (air) rights normally accompany property ownership. Thus, a property owner is guaranteed sunlight when the sun is directly overhead. However, structures, vegetation or other obstructions on abutting property can reduce or eliminate direct sunlight as the sun rises and sets. As a result, a new or improved structure, or vegetation growth may cause a loss of sunlight needed to provide solar energy. (See FIGURE 2). U. S. jurisprudence does not recognize certain common law doctrines which prevent shading from features present on adjoining property. This contrasts with other common law doctrines such as prescription or dedication which recognize an adverse interest or use of private property without ownership, based on a commonly accepted and open use of such property. As an example, a property owner can be prohibited from closing a publicly used path or road across private property if such use has been continuous for a certain period of time and no effort has been made to stop the particular use.

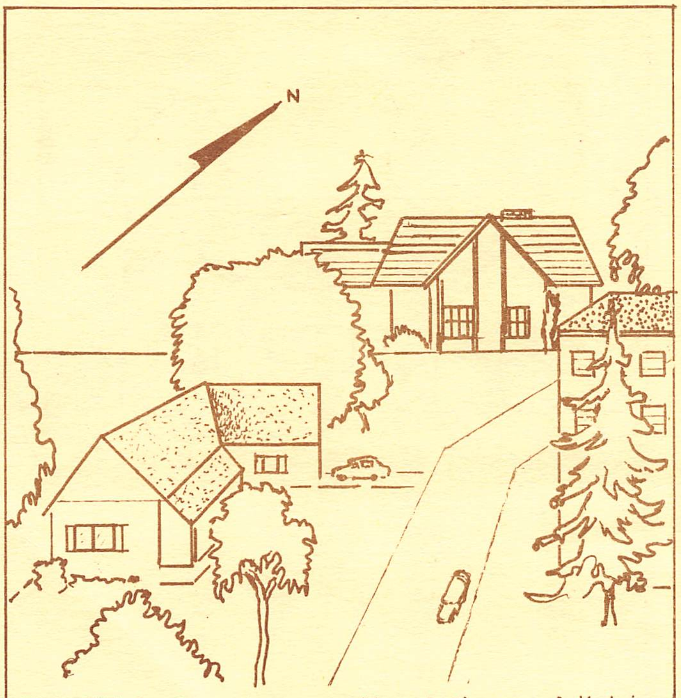

FIGURE 2: Structures or Vegetation on Adjoining Property can reduce Available Sun.
SOURCE: USDHUD/USDOE, 1979.

The degree of solar access protection necessary is dependent on the type of solar system employed and the location of the device which collects solar energy. Basically, there are two (2) types of solar systems: active and passive. Active solar systems generally utilize a collector which accumulates energy in the form of heat and, through mechanical or other means, transports it to the location of use or storage. An example of an active system is a solar domestic hot water heater. A passive solar system, in contrast, makes no use of intermediary mechanisms and directly uses or absorbs solar energy. A common example of a passive system is a large, south facing window, which

TABLE 1

Solar Collector Location

LOCATION	SYSTEM TYPE	TYPICAL USE
Rooftop	Active	Domestic hot water heating; space heating
South Wall	Passive	Direct collection of heat (sunlight), may be accompanied by use of storage devices such as water drum
South Lot	Active Passive	Use of reflectors to assist active or passive systems; greenhouse
Detached	Active	Domestic hot water heating; space heating

Source: Protecting Solar Access for Residential Development, HUD/DOE, 1979.

permits light to enter structure. The window serves as a collector, allowing the sun's rays to enter and warm one or more rooms.

There are four (4) principal locations for passive or active solar collectors. TABLE 1 lists each location and briefly describes common uses associated with each site; FIGURE 3 illustrates the location of each collector type.

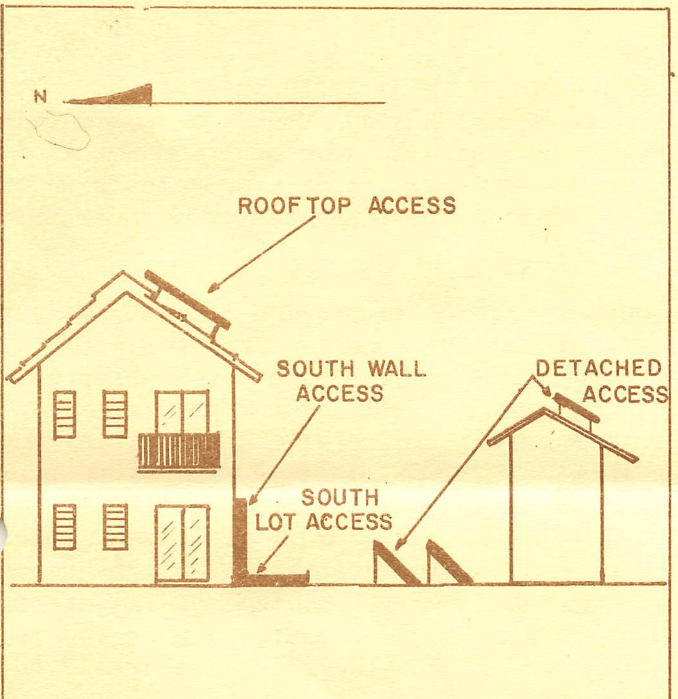

FIGURE 3: Solar Collector Locations.

SOURCE: USDHUD/USDOE, 1979.

Acting to protect solar access is somewhat complex. Both the public and private sectors can take actions to help ensure adequate exposure to sunlight. Another factor which directly impacts efforts to provide sufficient access is the degree of development of those areas affected. It would seem to be less difficult to plan for adequate solar exposure in residential, commercial or industrial areas yet to be developed, rather than attempt retroactively to impose protective mechanisms in built areas.

In order to meet the access differences between areas that are fully developed (or nearly so), partially developed, and undeveloped or sparsely developed, the Environmental Law Institute recently drafted a model approach for solar access protection ordinances. The model approach suggests two (2) principal means for providing protection: adoption of a scheme to accommodate access on a lot-by-lot basis, or adoption of a measure which provides access protection on an areawide basis.

For highly developed areas, a property owner wishing to obtain access protection would apply to the appropriate local government for recording of an existing or proposed solar system. To prevent a recording, the owner of an adjoining parcel would have to show that reasonable future use of property would be unduly restricted. In partially developed areas, a person seeking to obtain an access recording would be required to demonstrate that such action would not prohibit or severely restrict development of abutting property to the extent permitted by prevailing regulations. In both cases, appeals regarding recordings would be handled by a public hearing before the local governing body. Following approval, the local government would not be allowed to issue development permits which would shade a solar collector and owners of adjacent properties could not allow vegetation to shade a collector. Although somewhat cumbersome, the procedure does provide access protection on a lot-by-lot basis.

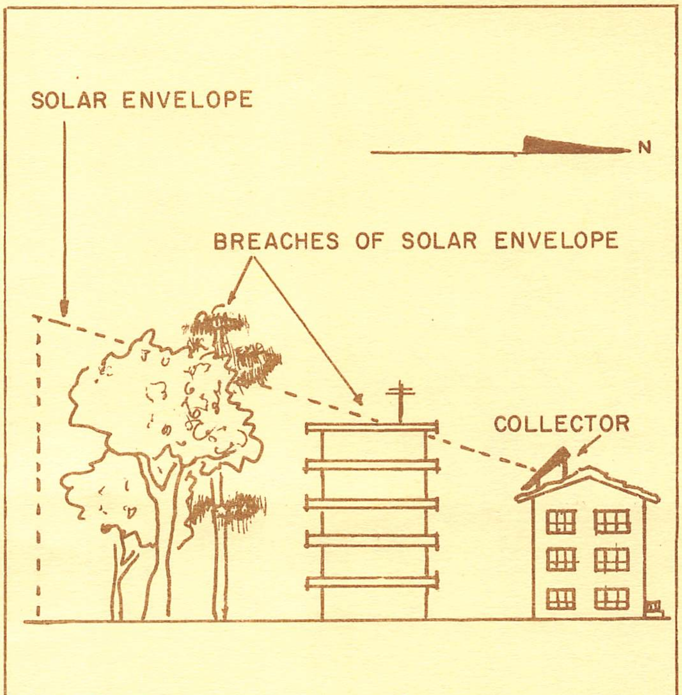

FIGURE 4: Solar Envelope Concept.

SOURCE: "The Right To Sunlight," *Environment*, Sept., 1979.

For areawide protection, where land is sparsely developed or undeveloped, a three dimensional "solar envelope" for each lot is created. The envelope, as illustrated by FIGURE 4, consists of planes of varied slopes and angles. Adjacent structures and vegetation would not be permitted to breach the envelope. The local government, as in the previously suggested access protection scheme, would not be permitted to issue development permits which cause a breach of the solar envelope.

There are a number of alternatives which could protect solar access with little or no governmental involvement. The first such alternative involves an agreement between owners of adjoining property to create a solar easement. Essentially, the easement is defined as a "negative easement" as one property owner agrees not to take some action that otherwise would be permissable. Once properly recorded, easements would remain with the property forever or for a stipulated period of time. An example of a negative easement is a situation where a property owner on the southern border of another parcel agrees to maintain vegetation at or below a twelve (12) degree angle, as measured from a particular point. (See FIGURE 5). This technique will ensure that sufficient sunlight will strike an established or proposed solar system. State governments can encourage the use of access easements by enacting statutes which specifically authorize such easements and prescribe their general contents.

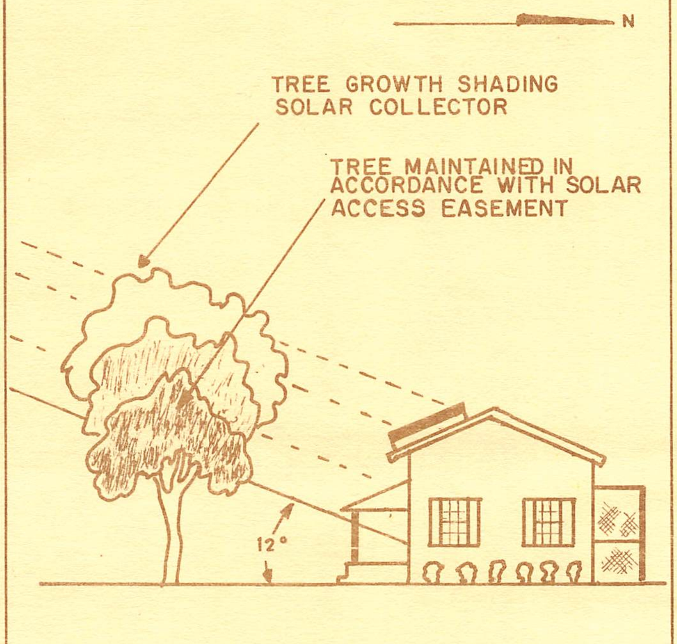
N
TREE GROWTH SHADING SOLAR COLLECTOR
TREE MAINTAINED IN ACCORDANCE WITH SOLAR ACCESS EASEMENT
12°

FIGURE 5: Illustration of the operation of a Solar Access Easement.
SOURCE: USDHUD/USDOE, 1979

A second means to guarantee access without active government intervention is through the use of restrictive covenants. Particularly appropriate for new developments, a covenant could function in a number of ways: 1) specifically permit the use of active or passive solar energy systems; 2) require property owners to maintain vegetation so as to prevent the casting of a significant shadow on solar collectors; and 3) ban or severely limit property development or improvements which will cast a significant shadow on a collector.

Another measure to provide solar access without active public intervention is through the application of appropriate site planning techniques when designing a residential, commercial, or industrial development. Site planning for solar protection requires that designs for structures, road, landscaping and open space take into consideration the sunlight needs of both active and passive solar systems. Designs sensitive to protecting access require two (2) considerations generally not addressed during normal project planning stages: assessing the site's availability of sunlight and the extent of shading, and what energy saving features (such as trees) are present on the site.

When designing a solar efficient development, principal considerations include the following:

1) shadow patterns: existing vegetation may need to be removed selectively to reduce shading; the shadows to be projected by proposed structures must be anticipated to avoid unnecessary shading of adjoining buildings;

2) road/street orientation: to the extent practicable roads or streets should have an east-west orientation to allow structures to face the south;

3) lot orientation: on an east-west sited street the long axis of a lot should run in a north-south direction, in a

traditional single family development this allows for maximum space between houses that back up to each other;

4) building orientation: to the extent possible, the longest side of a building should have a southerly exposure, allowing for possible use of both active and passive solar mechanisms; proper building orientation can make possible the use of solar energy even if roads do not have an east-west orientation and lots on such streets do not have a desired solar placement; and

5) vegetation: when trees are present on land to be developed, selective removal may be necessary to avoid undesirable shading; if additional trees and vegetation are to be placed around new or existing structures, species should be chosen that will provide desirable shading but will not shade solar devices upon reaching maturity.

In South Florida, vegetation generally is regarded as being equally as important as solar access, given the need for cooling during the lengthy warm season. Existing vegetation that may shade a proposed solar device should, in all probability, be retained and alternate strategies to use solar energy should be adopted. For example, if one or more large trees will shade all or a majority of the south-facing portion of a roof on a dwelling to be constructed, solar energy for water heating purposes could be used through installation of a detached collector. In this manner natural cooling attributes of existing vegetation will be preserved and solar energy will be utilized.

Public sector actions also can be encouraged, and even require, the use of solar energy. A number of states permit local governments to enact ordinances which regulate solar access within their community. Similarly, certain states authorize local units of governments to enact planning or zoning ordinances which provide for solar access. An indirect means of encouraging solar energy is the requirement now in force in several states that new structures have appropriate facilities for future installation of solar hot water systems. One state, California, requires subdivisions to be designed and constructed in such a manner that the use of solar energy is feasible in most, if not all, dwellings.

Although not specifically related to solar access, certain local actions may discourage the use of solar powered devices. Such actions include the following:

1) building height limits: solar collectors may extend beyond the height allowed by local codes;

2) building setback-requirements: minimum setbacks for front, side or rear yards may prohibit optimum solar orientation of a structure on a lot; also, minimum requirements may prohibit the use of solar devices which protrude from the wall of a structure;

3) maximum lot coverage restrictions: regulations which prescribe the maximum percentage of a lot that can be covered could reduce or eliminate the possibility of using detached solar collectors; and

4) community appearance standards: architectural, design or appearance standards may limit the use of rooftop solar collectors or the construction of buildings or dwellings which have features specifically designed to support passive or active solar systems.

These and other types of ordinances which limit potential solar usages should be examined, and where possible, amended to allow use of solar systems. Such amendments could include exempting solar collector from certain restrictions such as television antennas are often exempted form height limits. Or, solar collection systems could be declared a permitted or accessory use, and lot coverage or other restrictions would not be applicable.

The issue of solar access may not now be crucial or timely. However, the present and potential benefits to be derived from the use of solar energy make it clear that local governments should consider carefully the topic and take steps now to protect a very useful and important resource.

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